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Title: Evaluation of two disinfection systems for *Legionella* eradication from a hospital water supply.

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Background: Nosocomial infections are prevented using control measures against *Legionella* proliferation in water distribution system. However complete elimination of the bacteria is difficult to achieve with any disinfection approach. In this study we evaluated the efficacy of two continuous systemic disinfection methods to eradicate *Legionella* from a hospital water supply.

Methods: System 1 is electrochemical activated water containing sodium hypochlorite (neutral Anolyte); system 2 is solution of hydrogen peroxide and silver. These continuous disinfection systems were installed in a hospital in two distinct water supplies after hot water tank and before hot water distribution. Seven points of each water system were chosen for the study. Two samplings were performed before systems installation; after disinfection, 8 samplings were periodically performed for 5 months. A total of 70 samples were analysed for each system. Culture was performed following a standard quantitative protocol (detection limit 20 cfu/L). Samples (5 L) were concentrated by filtration. Aliquots (0.1 mL) of the untreated, heat-treated and acid-washed suspensions were plated on BCYE, BMPA and MWVY. The plates were incubated at 37°C for 15 days and *Legionella* colonies typed.

Results: System 1. Samples from water supply 1 showed *Legionella* contamination of 60-180 cfu/L in hot water tank and of 300-16000 cfu/L in distal points. After starting a continuous disinfection treatment (free chlorine 0.3-1.2 mg/L, mean 0.6 mg/L) all samples were negative. System 2. Samples from water supply 2 showed 180-24000 cfu/L. After starting the disinfection, at the level of 2 mg/L of hydrogen peroxide, the contamination was 20-15000 cfu/L; during the observation period the product showed variable concentrations and only in the second-last sampling, with higher concentration of product, the culture was negative. The colonization appeared again in the last sampling up to 600 cfu/L.

Conclusions: System 1 was effective in eradicating *Legionella* from hospital water supply in this experiment, with free chlorine concentration >0.2 mg/L (level suggested by Italian legislation 0.2 mg/L). System 2 based on hydrogen peroxide and silver was not efficient at the concentration proposed by manufacturer in this study. For systemic disinfection modalities the disinfectant levels must be carefully monitored.

